GULFCO MARINE MAINTENANCE
SUPERFUND SITE

Summary of Site Risks

What is Risk and how is it Calculated?

A CERCLA human health risk assessment estimates the "baseline risk." This is an estimate of the likelihood of health problems occurring if no cleanup action were taken at a site. To estimate the baseline risk at a CERCLA site, EPA identifies a four-step process:

Step 1: Identify Chemicals of Concern,

Step 2: Estimate Exposure,

Step 3: Assess Potential Health Effects,

Step 4: Characterize Site Risk

In Step 1, the risk assessor compiles all the chemical data for a site to identify what chemicals were detected in each medium (i.e. soil and groundwater). Chemicals that are detected frequently at high concentrations, or are considered highly toxic, are considered “chemicals of concern” and are evaluated in the risk assessment In Step 2, the risk assessor considers the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, the risk assessor calculates a "reasonable maximum exposure" (RME) scenario, which portrays the highest level of human exposure that could reasonably be expected to occur. In Step 3, the risk assessor compiles toxicity information on each chemical, including numeric values for assessing cancer and noncancer adverse health effects. The EPA identifies two types of risk: cancer risk and noncancer risk. The likelihood of any kind of cancer resulting from a CERCLA site is generally expressed as an upper bound probability; for example, a "1 in 10,000 chance." In other words, for every 10,000 people that could be exposed, one extra cancer may occur as a result of exposure to site contaminants. An extra cancer case means that one more person could get cancer than would normally be expected to from all other causes. For non-cancer health effects, the risk assessor calculates a "hazard index" (HI). The key concept here is that a "threshold level" (measured usually as a hazard index of less than 1) exists below which non-cancer health effects are no longer predicted. In Step 4, the risk assessor uses the exposure information from Step 2 and toxicity information from Step 3 to calculate potential cancer and noncancer health risks. The results are compared to EPA acceptable levels of risk to determine whether site risks are great enough to potentially cause health problems for populations at or near the CERCLA site.

Chemicals of Concern (COCs)

COCs are chemicals that pose a carcinogenic risk to human health greater than 1 in 1,000,000 (1×10^{-6}), have a noncarcinogenic hazard index (HI) greater than (>) 1, or are found in Site ground water at concentrations that exceed MCLs. The following list of COCs were chosen as risk drivers due to their highest potential cancer risk and/ or toxicity potential to any or all of the effected potential receptors (off-site residential, future industrial/commercial worker, future on site construction worker, youth trespasser, and contact recreational user).

The following constituents are considered to be COCs at the Site:

Ground Water COCs:

1,1-Dichloroethene, 1,2,3-Trichloropropane, cis-1,2-Dichloroethene, Trichloroethene, Vinyl Chloride.

Brief Descriptions of the COCs at the Site:

Each of the COCs is a volatile organic compound (VOC).

Volatile Organic Compounds (VOCs): VOCs are organic chemicals that evaporate easily at room temperature.

1,1-Dichloroethene

1,1-Dichloroethene is an industrial chemical that is not found naturally in the environment. It is a colorless liquid with a mild, sweet smell. 1,1-Dichloroethene is used to make flame retardant coatings for steel pipes, and in adhesive applications. Exposure to 1,1-dichloroethene occurs mainly in the workplace. Breathing high levels of 1,1-dichloroethene can affect the liver, kidney, and central nervous system.

1,2,3-Trichloropropane

1,2,3-Trichloropropane is a colorless, heavy liquid with a sweet but strong odor. It is mainly used to make other chemicals. Some of it is also used as an industrial solvent, paint and varnish remover, and cleaning and degreasing agent. Exposure to high levels of 1,2,3-trichloropropane for a short time causes eye and throat irritation.

cis-1,2-Dichloroethene

1,2-Dichloroethene, also called 1,2-dichloroethylene, is a highly flammable, colorless liquid with a sharp, harsh odor. It is used to produce solvents and in chemical mixtures. Breathing high levels of 1,2-dichloroethene can make you feel nauseous, drowsy, and tired.

Trichloroethene

Trichloroethylene (TCE) is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers. Drinking or breathing high levels of trichloroethylene may cause nervous system effects, liver and lung damage, abnormal heartbeat, coma, and possibly death.

Vinyl Chloride

Vinyl chloride is a colorless gas. It burns easily and it is not stable at high temperatures. It has a mild, sweet odor. It is a manufactured substance that does not occur naturally. It can be formed when other substances such as trichloroethane, trichloroethylene, and tetrachloroethylene are broken down. Vinyl chloride is used to make polyvinyl chloride (PVC). PVC is used to make a variety of plastic products, including pipes, wire and cable coatings, and packaging materials.

COCs at the site pose a carcinogenic risk to human health greater than 1 in 1,000,000 (1×10^{-6}), have a noncarcinogenic hazard index (HI) greater than (>) 1, or are found in Site ground water at concentrations that exceed MCLs.

Land and Groundwater Use Assumptions

Land Use

Approximately 78 people live within the one square mile area surrounding the Site (EPA, 2005a). Approximately 3,392 people live within 50 square miles of the Site (EPA, 2005a). There are no schools, nursing homes, or other sensitive subpopulations within a mile of the Site. Residential areas are located south of Marlin Avenue, approximately 300 feet west of the Site, and 1,000 feet east of the Site.

Historically, the South Area of the Site was used as a barge cleaning and maintenance facility. The Site currently is unused but it is anticipated that the South Area will be used for commercial/industrial purposes in the future. To the west of and directly adjacent to the Site is an unused lot that was formerly a commercial marina. West of that lot, beyond a second vacant lot, is a residential development with access to the Intracoastal Waterway. An active commercial operation is located east of the South Area.

The North Area of the Site contains closed surface impoundments (closed in 1982) and is, for the most part, unused. Some of the North Area is upland created from dredge spoil, but most of this area is considered wetlands and the wetlands area has never consistently been used. The upland area of the North Area has been used as a parking lot. Future land use at the North Area is limited given that much of it is considered wetlands and most of the upland part of the North Area consists of the closed former surface impoundments.

Groundwater Use

Because of high total dissolved solids in Zone A, B, and C groundwater at the Site, the groundwater ingestion and use pathway is incomplete for these three units. Also, restrictive covenants prohibiting groundwater use have been filed for the Site. Impacted groundwater does not affect surface water at the Site. So the only complete exposure pathway is the volatilization to indoor and outdoor air pathway in areas above impacted groundwater. A restrictive covenant requiring any building design to preclude vapor intrusion has been filed for lots where VOC concentrations were measured in relatively high concentrations in groundwater.

Potential Exposure Pathways

Based on current and reasonable future land use, potentially exposed populations include future commercial/industrial workers and future construction workers at the Site. Soil is the primary media of concern for these receptors. A future indoor air exposure pathway was evaluated for

the commercial/industrial worker since VOCs were detected in Zone A groundwater. Additionally,

Exposure Pathways Affecting Each Population Group

Current and future land use based exposure pathways were identified and evaluated in the exposure assessment for the Basic Human Health Risk Assessment (BHHRA) for the Site. The following receptors were evaluated for onsite and offsite areas of the Site in the BHHRA:

North Area:

- **Offsite Resident**: Inhalation of ambient air
- **Future Onsite Industrial/Commercial Worker**: Inhalation of ambient/indoor air, skin contact with and accidental ingestion of water, skin contact with and/or ingestion of sediments, direct skin contact with and ingestion of soil
- **Future Onsite Construction Worker**: Inhalation of ambient air, inhalation of vapors close to source while excavation, skin contact with and accidental ingestion of water, skin contact with and/or ingestion of sediments, direct skin contact with and ingestion of soil.
- **Potential Current Youth Trespasser:** Inhalation of ambient air, skin contact with and accidental ingestion of water, inhalation of vapors close to source, direct skin contact and/or ingestion of sediment, and direct skin contact as well as ingestion of soil were evaluated for youth trespasser.
- **Contact Recreational User:** A contact recreation scenario was assessed for surface water and sediment in the wetlands and ponds of the North Area to represent a hypothetical receptor who occasionally contacts these media while wading, birding, or participating in other recreational activities.

South Area:

- **Offsite Resident:** Inhalation of ambient air, ingestion of fish, skin contact with and accidental ingestion of water, inhalation of vapors from groundwater, skin contact with and/or ingestion of sediments.
- **Future Onsite Industrial/Commercial Worker:** Inhalation of ambient/indoor air, direct skin contact with and ingestion of soil.
- **Future Onsite Construction Worker:** Inhalation of ambient/indoor air, direct skin contact with and ingestion of soil.
- **Potential Current Youth Trespasser:** Inhalation of ambient air and direct skin contact as well as ingestion of soil was evaluated for youth trespasser.
- **Contact Recreational User:** A contact recreation scenario was assessed for surface water and sediment in the wetlands and ponds of the South Area to represent a hypothetical receptor who occasionally contacts these media while wading, birding, or participating in other recreational activities.

Summary of Human Health Risk Characterization
Risk estimates were calculated for current future land use scenarios on site and off site for hypothetical human receptors. Cancer risks were estimated as the probability of an individual developing cancer over a lifetime as a result of exposure to the site's carcinogenic contaminants. Toxicity risk estimates for noncarcinogenic toxic chemicals are presented for COCs. The potential for noncarcinogenic hazards due to potential exposures to chemicals was evaluated by calculating an HI for the COCs at Gulfco. The Baseline Risk Assessment shows the detailed calculation of risk. The Baseline Risk Assessment organized the types of risk at the site according to various exposure scenarios. Each exposure scenario specifies the type of human receptor (e.g., child resident, adult industrial worker), the exposure pathway (e.g., inhalation, ingestion) and the COC. If a contaminant or exposure scenario is found to produce a risk which will require a remedial action (based on either the carcinogenic risk or the HI) that contaminant or exposure scenario is said to "drive the risk" or "drive" the need for action. A remediation goal is set for site-related contaminants that drive risk. The following exposure scenarios are driving the need for action at the Site (all risks are expressed as Reasonable Maximum Exposure or RME).

Five different exposure scenarios were quantitatively evaluated for the different potentially contaminated media identified at the Site. Exposure scenarios were developed to describe current and potential future land use by various human receptors and included a **future industrial worker, future construction worker, current youth trespasser, current contact recreation receptor, and off-site resident**. Exposure and risks were calculated for both central tendency and RME scenarios.

The risk assessment showed that there was not unacceptable cancer risk or noncancer hazard indices for any of the current or future exposure scenarios except for future exposure to an indoor industrial worker if a building is constructed over impacted groundwater in the North Area. Potential cancer risks in the North Area using maximum shallow Zone a groundwater concentrations as well as vapor intrusion computer programs were predicted to be greater than 1×10^{-4} while the HIs were estimated to be greater than 1. It should be noted that this scenario was evaluated despite the current restrictive covenant on Lots 55, 56, and 57 that require future building design to preclude vapor intrusion, which would effectively make this pathway incomplete. Therefore, current risks at the Site are not unacceptable given the low levels of potential exposure. Estimated risks from Zone A groundwater at the South Area were below EPA's goals and, therefore, adverse risks associated with the vapor intrusion pathway are unlikely in this area.